

Amplituhedron Nobel Prize Nomination Letter

By: Jeffrey Klimes

The title most significant advancement in theoretical of the last year should be awarded to Nima Arkani-Hamed and his associates at Harvard and the Institute for Advanced Study at Princeton for their discovery of the *Amplituhedron*. The Amplituhedron is a simple geometrical object that can be described as a higher order polyhedron whose volume is the solution to a difficult integral that describes particle interactions in quantum field theory. That is the simple explanation however. Many physicists are astounded by the development as it allows them to solve computations that were considered impossible before. This opens up research possibilities that were once unavailable. In a similar manner that Feynman Diagrams once revolutionized the way physicists work on particle interaction so does the Amplituhedron revolutionize the way physicists describe quantum field interactions. They are able to build off those diagrams in a way that reduces the computational complexity of the associated calculations by many orders of magnitude. Figure 1 shows how the Amplituhedron problem can be setup to solve an eight-gluon system.

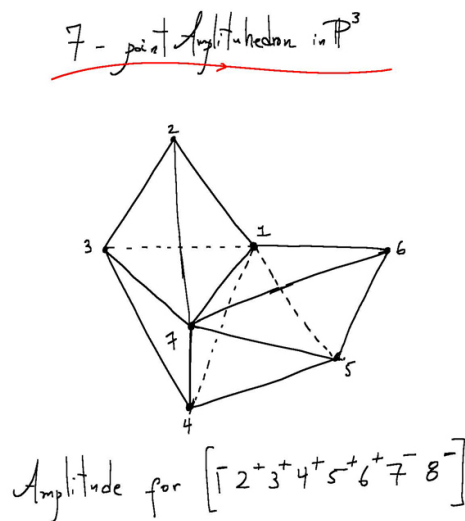


Figure 1: The Amplituhedron for a simple 8-gluon system.

Reference:

Wolchover, N. (2013, September 17). *A jewel at the heart of quantum physics*. Retrieved from <https://www.simonsfoundation.org/quanta/20130917-a-jewel-at-the-heart-of-quantum-physics/>